IN THE SPECIFICATION:

The specification as amended below with replacement paragraphs shows added text with underlining and deleted text with ~~strikethrough~~.

Please AMEND the paragraph beginning at page 5, line 9, as follows:

In the above listed algorithms, (1) and (2) consider the time elements only, and ~~does~~ do not take the efficiency of disk access (shortening the seek time) into account. On the other hand, (3) and (4) consider the elements of efficiency, but ~~does~~ do not take the elements of time into account. Therefore, they are not appropriate for a real time process. As a result, the algorithm (5) is commonly used at present because it takes both time and efficiency in disk access into account.

Please AMEND the paragraph beginning at page 9, line 15, as follows:

When a packet is transferred in the isochronous transfer system of the IEEE 1394, data to be transferred is normally contained in the packet. However, for the picture data transferred at the above mentioned variable rate, the transfer time guarantee is maintained by transmitting a dummy packet containing no data when data to be transferred is not regularly arranged due to the variable rate (in accordance with IEC (International Electrotechnical Commission) 18663 and IEEE 1394-1995).

Please AMEND the paragraph beginning at page 10, line 1, as follows:

FIG. 4 shows the procedure of the above mentioned packet transfer system. In this procedure, a 4-byte time stamp T is added to a 188-byte transport packet 3 to generate a 192-byte packet 3a. The packet is divided into 24-byte data blocks. The four (which can be any other integer) data blocks are collected as one data block packet 4, and transferred as ~~a~~ an isochronous transfer packet.

Please AMEND the paragraph beginning at page 10, line 15, as follows:

One cycle start packet S and one data block packet 4 are transferred every 125 μs. If there is no data block packet 4, a dummy packet 5 containing only a CIP header is transferred as ~~a~~ an isochronous transfer packet.

Please AMEND the paragraph beginning at page 10, line 20, as follows:

When the conventional deadline is set under the above mentioned situation, the deadline is defined for a case severer than a normal case based on the maximum transfer rate at which all isochronous transfer packets contain the data block packet 4. Therefore, data cannot be processed ~~thorough~~ through a larger number of channels.

Please AMEND the paragraph beginning at page 13, line 1, as follows:

In each physical zone, a predetermined number of tracks are radiantly provided. Each track is divided into one or more frames 14. The frame 14 is divided into a plurality of segments. Normally, the leading segment is an address segment (ADRS) 15, and other segments ~~re~~ are referred to as data segments 16. Clock marks 17 indicated by Δ shown in FIG. 5 are assigned to the address segment 15 and the data segment 16.

Please AMEND the paragraph beginning at page 16, line 16, as follows:

The range of the logical zones is designed based on the range (about 200 tracks) of beam jump only by the beam deflection scanning (optical seek) by the drive of an objective 30 without a seeking operation performed by moving the body of the head as shown in FIG. 8. FIG. 8 shows an accessible area (200 tracks for the maximum width from a defective block 31 to a spare block 32) by the objective 30. The speed of the optical seek by the objective 30 is approximately 5 ms at maximum. When 200 tracks 17 are scanned in the seeking operation by moving the body of the head as in the above mentioned optical seeking operation, a double or higher speed is required.

Please AMEND the paragraph beginning at page 17, line 5, as follows:

In the ASMO, the logical zones are sequentially accessed in principle. Although the head moves by the maximum seek distance (from the innermost zone to the outermost zone) in the next step, seamlessly fetching and reading voice and picture data can be guaranteed. The access wait time taken by the movement for the above mentioned maximum seek distance is one second. Therefore, to fetch/read voice and picture data in real time in one second, there is an internal buffer for storing data of 1 MB.

Please AMEND the paragraph beginning at page 19, line 24, as follows:

For example, when ~~a~~ an isochronous transfer is performed, the data transfer rate changes with time depending of the ratio of inserted dummy packets. The scheduling unit dynamically determines the deadline of the write/read processes depending on the transfer rate at each time point, and sets the schedule of performing the write/read processes in order from the process having the earliest deadline. Then, the control unit controls the execution of the write/read processes according to the set schedule.

Please AMEND the paragraph beginning at page 20, line 10, as follows:

With the above mentioned access control apparatus, the deadline is determined based on the actual transfer rate, and flexible scheduling performed based on the deadline. Therefore, the scheduling is performed based on the transfer rate of each channel even when statistically multiplexed picture data at a variable rate is recorded/read in real time, thereby recording/reading data through a larger number of ~~channel~~ channels.

Please AMEND the paragraph beginning at page 37, line 3, as follows:

For example, when ~~a~~ an isochronous transfer is performed, the data transfer rate changes with time depending of the ratio of inserted dummy packets. The scheduling unit 41 dynamically determines the deadline of the write/read processes depending on the transfer rate at each time point, and sets the schedule of performing the write/read processes in order from the process having the earliest deadline. Then, the control unit 42 controls the execution of the write/read processes according to the set schedule.

Please AMEND the paragraph beginning at page 40, line 14, as follows:

With the above mentioned access control apparatus, the deadline is determined based on the actual transfer rate, and flexible scheduling is performed based on the deadline. Therefore, the scheduling is performed based on the transfer rate of each channel even when statistically multiplexed picture data at a variable rate is recorded/read in real time, thereby recording/reading data through a larger number of ~~channel~~ channels.

Please AMEND the paragraph beginning at page 40, line 14, as follows:

FIG. 12 shows the configuration of the storage system containing the access control apparatus according to an embodiment of the present invention. The storage system shown in FIG. 12 comprises a storage device 51, an STB 52, and a digital TV 53. Each of these devices is interconnected through an ~~IEEE1394~~ IEEE 1394 line 54. The STB 52 receives, for example, an MPEG picture data from an external network, and transfers the data to the storage device 51 by an isochronous transfer. Then, the digital TV 53 reads the picture data stored in a storage device 51, and displays it on the screen.

Please AMEND the paragraph beginning at page 41, line 7, as follows:

The LSI 62 functions as a communications interface between the buffer memory 64 and the storage device 51. ~~The buffer memory 64.~~ The buffer memory 64 comprises, for example, 16 unit blocks having the capacity of 64 KB, and temporarily stores picture data transmitted through the buffer memory 64 or the picture data to be transmitted to the line 54.

Please AMEND the paragraph beginning at page 46, line 6, as follows:

In the example of scheduling shown in FIG. 14, for simple explanation, it is assumed that the capacity of the unit block 64a of the buffer memory 64 equals the capacity of four valid packets, and the deadline can be determined from the time required to store four valid packets. Each of the arrows #1 through #10 indicates the read/write processes on the four valid packets, and the number of each arrow indicates the execution order of the scheduled process. The source of an arrow indicates the deadline determination timing, and the destination of an arrow indicates the determined deadline. The outline of the scheduling process is described as follows.

Please AMEND the paragraph beginning at page 47, line 17, as follows:

In this example, ~~wince~~ since four valid packets W are continuously transmitted through the Ch 1 and Ch 3, the binary data is 1111. In addition, since the deadline is determined based on the time required to transfer the four valid packets, the same deadline is determined for the Ch 1 and Ch 3. Therefore, the current position H0 of the disk head is referenced, and the write process performed on the ~~Ch1~~ Ch1 having an address point closer to the position (having a shorter seek distance) is scheduled by priority.

Please AMEND the paragraph beginning at page 49, line 8, as follows:

In this example, the time required to temporarily store data is within the time taken to transfer 4 through 8 packets. Then, assume that data is input to the buffer memory 64 at the maximum transfer rate immediately after the deadline is set based on the longest transfer time for 8 packets. In this case, two blocks of data are stored in the buffer memory 64 while ~~already stored~~ one block of already stored data is written to the disk 36. Therefore, at least three blocks of buffer areas are required for each channel, and it is necessary to set the deadline within the transfer time for eight packets.